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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,833	12/30/2003	John C. Batterton	09991-151001	9382
26161	7590	07/06/2005	EXAMINER	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			MRUK, GEOFFREY S	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 07/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/749,833

Applicant(s)

BATTERTON ET AL.

Examiner

Geoffrey Mruk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1 November 2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities: The term "width" used to describe the circular geometries of the nozzle plate is unclear. The Examiner suggests using "diameter" to describe the circular geometries of the nozzle plate.

Appropriate correction is required.

### ***Claim Objections***

Claims 1, 5, 7, 10, and 12 are objected to because of the following informalities:

With respect to claim 1, the term "nozzle width" is unclear. The Examiner suggests using "nozzle diameter".

With respect to claim 5, the term "nozzle opening width" is unclear. The Examiner suggests using "nozzle opening diameter".

With respect to claim 7, the Examiner suggests changing "2 micron to about 50 micron" to "2 microns to about 50 microns".

With respect to claim 10, the term "nozzle opening width" is unclear. The Examiner suggests using "nozzle opening diameter". The Examiner suggests changing "200 micron" to "200 microns".

With respect to claim 12, the term "nozzle width" is unclear. The Examiner suggests using "nozzle diameter".

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8-10, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Bentin (US 4,413,268).

With respect to claim 1, Bentin discloses a drop ejector (Column 2, lines 59-63), comprising: a flow path (Fig. 2, element 5) in which fluid is pressurized to eject drops from a nozzle opening (Fig. 2, element 2) formed in a substantially planar substrate (Fig. 2, element 1), and a channel formed (Fig. 6a, element 6) in the substrate proximate the nozzle opening, the channel being spaced from the nozzle opening by a distance of about 20% of a nozzle width or more (Column 4, lines 1-19; i.e.  $d=50\mu\text{m}$ ,  $D-d \leq 20\mu\text{m}$ , therefore,  $(D-d)/2=10\mu\text{m}$  thus the 20% spacing).

With respect to claim 2, Bentin discloses the nozzle opening (Fig. 2, element 2) is surrounded by the channel (Fig. 6a, element 6, Column 3, lines 66-68).

With respect to claim 3, Bentin discloses the channel (Fig. 6a, element 6) is in the shape of a circle (Column 5, lines 22-25).

With respect to claim 4, Bentin discloses the channel (Fig. 6a, element 6) extends radially (centerlines of Fig. 5a and 5b) from the nozzle opening (Fig. 6a, element 2).

With respect to claim 5, Bentin discloses the channel (Fig. 6a, element 6) has a width that is about twice the nozzle opening (Fig. 6a, element 2) width or less (Column 3, lines 58-68; Column 4, lines 1-31; i.e. nozzle spacing=100 $\mu$ m, D=35 $\mu$ m, therefore channel width=30 $\mu$ m).

With respect to claim 6, Bentin discloses the channel (Fig. 6a, element 6) has a width of about 100 microns or less (Column 3, lines 58-68; Column 4, lines 1-31; i.e. nozzle spacing=100 $\mu$ m, D=35 $\mu$ m, therefore the channel width=30 $\mu$ m).

With respect to claim 8, Bentin discloses the substrate (Fig. 6a, element 1) is a silicon material (Column 3, lines 12-21).

With respect to claim 9, Bentin discloses the planar substrate includes a plurality of nozzle openings (Fig. 6a, element 2) and channels (Fig. 6a, element 6) proximate the nozzle openings (Column 3, lines 66-68).

With respect to claim 10, Bentin discloses the nozzle opening width is about 200 microns or less (Column 4, line 1).

With respect to claim 12, Bentin discloses a method of fluid ejection (Column 1, 34-46; i.e. droplet-on-demand), comprising: providing a drop ejector (Column 2, lines 59-63) including a flow path (Fig. 2, element 5) in which fluid is pressurized for ejection through a nozzle opening (Fig. 2, element 2) formed in a substrate (Fig. 2, element 1), and a channel (Fig. 6a, element 6) formed in the substrate proximate the nozzle opening, the channel being spaced from the nozzle opening by a distance of about 20% of the nozzle width or more (Column 4, lines 1-19; i.e.  $d=50\mu\text{m}$ ,  $D-d \leq 20\mu\text{m}$ , therefore,  $(D-d)/2=10\mu\text{m}$  thus the 20% spacing); providing a fluid that is wicked by capillary forces

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into the space (Fig. 6a, element 7, Column 5, lines 19-21) defined by said channel, and ejecting said fluid through said nozzle opening by pressurizing said fluid in said flow path.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bentin (US 4,413,268) in view of Su et al. (US 6,132,028).

Benton discloses the drop ejector of claim 1.

Benton fails to disclose the depth of the channel (Fig. 6A, element 6) is from about 2 microns to about 50 microns.

Su discloses an enlarged view of a nozzle (Fig. 3, element 26) in a thermal ink jet head that includes an elevated surface (Fig. 3, element 52). The elevated surface is 25µm above the first plane (Fig. 3, element 34, Column 4, lines 6-8).

At the time of the invention, it would have been obvious to use the dimensions of Su in the jet nozzle of Bentin. The motivation for doing so would have been to "prevent the wiper from dragging substantial debris or intermixed ink onto a nozzle" (Column 3, lines 23-55).

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2. Claims 11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentin (US 4,413,268) in view of Held (US 5,853,861).

Bentin discloses the drop ejector of claim 1 and the method of fluid ejection of claim 12.

Benton fails to disclose a piezoelectric actuator, the fluid having a surface tension of about 20-50 dynes/cm, and the fluid having a viscosity of about 1 to 40 centipoise.

Held discloses a "piezo element for either a drop on demand device or a continuous device" (Column 5, lines 54-55), "pigmented ink jet inks suitable for use with ink jet printing systems should have a surface tension in the range of about 20 dyne/cm to about 70 dyne/cm" (column 5, lines 45-49) and an "acceptable viscosity is no greater than 20cP" (Column 5, lines 49-50).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Held for the ink jet printer of Bentin. The motivation for doing so would have been the "ink has physical properties compatible with a wide range of ejecting conditions" and "The inks have excellent storage stability for a long period and do not clog in an ink jet apparatus. Further, the ink does not corrode parts of the ink jet printing device it comes in contact with, and it is essentially odorless and non-toxic" (Column 5, lines 51-60).

***Conclusion***

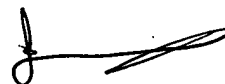
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM  
6/27/2005

GM



Stephen D. Meier  
Primary Examiner